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NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON --ETC F/6 13/13
NATIONAL DAM SAFETY PROGRAM, GRUENDYKE MILL DAM (NJ00793) DELAY--ETC(U)
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DELAWARE RIVER BASIN
MUSCONETCONG RIVER
WARREN COUNTY
NEW JERSEY

GRUENDYKE MILL DAM

NJ 00793

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



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DEPARTMENT OF THE ARMY DTIC

Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.			



IN REPLY REFER TO

NAPEN-N

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE - 2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

31 AUG 1981

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Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Gruendyke Mill Dam in Warren County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Gruendyke Mill Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in poor overall condition. The dam's spillway is considered inadequate because a flow equivalent to 51 percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance, is the One Hundred Year Flood). To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated.

b. Within three months from the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) Design and oversee reconstruction of the dam, and appurtenant structures. Attention should be paid to providing more adequate drawdown capacity.

(2) Design and oversee procedures for the repair of erosion at right and left abutments.

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Honorable Brendan T. Byrne

(3) Design and specify repairs for collapsed sections of the spillway training wall at the left side of the dam.

(4) Design and oversee procedures for the removal of trees and their roots from the area adjacent to the former raceway structure.

(5) Evaluate seepage adjacent to the foundation of the former raceway structure and design remedial measures, as needed.

c. Within three months from the date of approval of this report the owner should start a program of checking the condition of the dam periodically.

d. Within six months from the date of approval of this report the owner should clear trees and brush from the discharge channel and from a zone 15 feet wide on either side of the discharge channel for a distance of 100 feet downstream from the toe of the dam or to the limits of the property whichever is the lesser distance.

e. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

f. An emergency action plan and warning system should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

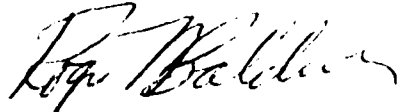
A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Courter of the Thirteenth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

NAPEN-N
Honorable Brendan T. Byrne

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,



ROGER L. BALDWIN
Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

Incl
As stated

Copies furnished:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
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GRUENDYKE MILL DAM (NJ00793)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 21 April 1981 by Anderson-Nichols and Co. Inc., under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Gruendyke Mill Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in poor overall condition. The dam's spillway is considered inadequate because a flow equivalent to 51 percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance, is the One Hundred Year Flood). To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated.

b. Within three months from the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) Design and oversee reconstruction of the dam, and appurtenant structures. Attention should be paid to providing more adequate drawdown capacity.

(2) Design and oversee procedures for the repair of erosion at right and left abutments.

(3) Design and specify repairs for collapsed sections of the spillway training wall at the left side of the dam.

(4) Design and oversee procedures for the removal of trees and their roots from the area adjacent to the former raceway structure.

(5) Evaluate seepage adjacent to the foundation of the former raceway structure and design remedial measures, as needed.

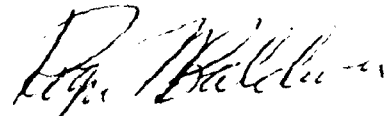
c. Within three months from the date of approval of this report the owner should start a program of checking the condition of the dam periodically.

d. Within six months from the date of approval of this report the owner should clear trees and brush from the discharge channel and from a zone 15 feet wide on either side of the discharge channel for a distance of 100 feet downstream from the toe of the dam or to the limits of the property whichever is the lesser distance.

e. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

f. An emergency action plan and warning system should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

APPROVED:



ROGER L. BALDWIN
Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

DATE:

31 Aug 57

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Gruendyke Mill Dam
Identification No.:	Fed ID No. NJ00793
State Located:	New Jersey
County Located:	Warren
Stream:	Musconetcong River
River Basin:	Delaware
Date of Inspection	April 21, 1981

ASSESSMENT OF GENERAL CONDITIONS

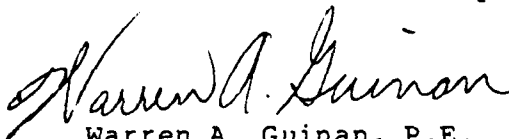
Gruendyke Mill Dam is about 70 years old and is in poor condition. It is a small dam and is classified as significant hazard. This run-of-the-river, concrete and stone masonry structure is 138 feet long, its structural height is 12.0 feet, and the spillway (115 feet long) has a 2-foot wide concrete cap. A 5-foot stoplog section, located 29 feet from the left end of the dam, is included in the spillway. The left abutment training wall downstream of the dam has collapsed from undermining. Erosion has damaged both left and right abutments. The concrete spillway crest is cracked and spalled. Water is leaking underneath and through the base foundation of the old raceway structures at the right side of the dam. Small trees are growing in the channel adjacent to the raceway foundation. The left concrete abutment is badly deteriorated. A major vertical crack is visible near the center of the dam and portions of this part of the dam are missing. The stoplog abutments are badly deteriorated. The original outlet works are abandoned and filled with silt; all gates appear to have been removed, and the outlet channel has been filled in with earth, stone and debris. The concrete structures of the mill works are cracked and deteriorated. The spillway is capable of discharging 1490 cfs which is 50.9% of the 100-year spillway design flood discharge of 2,926 cfs and the spillway is therefore considered inadequate.

It is recommended that the owner retain the services of a professional engineer, qualified in the design and inspection of dams, to accomplish the following tasks beginning soon: design and oversee reconstruction of the dam, stoplog facility and outlet works (would include increasing spillway capacity or ensuring the dam's stability under overtopping, and providing adequate drawdown capacity); repair erosion at right and left abutments; design and specify repairs for collapsed sections of the spillway training wall at the left side of the dam; remove

trees and their roots from the area adjacent to the former raceway structure; and evaluate seepage adjacent to the foundation of the former raceway structure and design remedial measures, if needed.

It is further recommended that the owner undertake the following as a part of operating and maintenance procedures beginning soon: start a program of periodically checking the condition of the dam; and develop an emergency action plan which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam. In the near future: clear trees and brush from the discharge channel and from a zone 15 feet wide on either side of the discharge channel for a distance of 100 feet downstream from the toe of the dam or to the limits of the property whichever is the lesser distance; and develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

Anderson-Nichols & Company, Inc.

A handwritten signature in cursive script, reading "Warren A. Guinan".

Warren A. Guinan, P.E.
Project Manager
New Jersey 16848

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SAN JUAN



PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonable possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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GRUENDYKE MILL DAM FED ID NO. NJ00793 NJ No. 24-24

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY INSPECTION PROGRAM
GRUENDYKE MILL DAM
FED ID NO. #NJ00793, NJ NO. 24-24

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. Authority to perform the Phase I Safety Inspection of Gruendyke Mill Dam was received from the State of New Jersey, Department of Environmental Protection, Division of Water Resources by letter dated 12 December 1980 under Basic Contract No. FPM-39 and Contract No. A01093 dated 10 October 1979. This Authority was given pursuant to the National Dam Inspection Act, Public Law 92-367 and by agreement between the State and the U.S. Army Engineers District, Philadelphia. The inspection discussed herein was performed by Anderson-Nichols & Company, Inc.

b. Purpose: The purpose of the Phase I Investigation is to develop an assessment of the general conditions with respect to the safety of Gruendyke Mill Dam and appurtenances. Conclusions are based upon available data and visual inspection. The results of this study are to be used to determine any need for emergency measures and conclude if additional studies, investigations, and analyses are necessary and warranted.

1.2 Project Description

a. Description of Dam and Appurtenances. Gruendyke Mill Dam is a run-of-the-river, concrete and stone masonry dam 12.0 feet high, 138 feet long with a 2-foot wide crest at its spillway. Up and downstream side slopes are essentially vertical. The spillway is a free overflow concrete weir with a vertical downstream face. An abandoned millrace is situated on the right side of the dam with headworks removed and inlet openings blocked. A 5-foot stoplog bay is located just to the left of center of the dam. The upstream reservoir is the Musconetcong River. The downstream channel is clean with tree-lined embankments. The dam and upstream channel are relatively free of debris.

b. Location. The dam is located in Warren County, New Jersey on the Musconetcong River. The dam is at 40° 50.9' north latitude and 74° 49.3' west longitude on the Hackettstown Quadrangle. The dam may be reached by driving east on U.S. Route 46 at Hackettstown about 600' till you reach the Musconetcong River. The damsite is about 160 feet upstream of the Route 46 Crossing. A location map has been included as Figure 2.

c. Size Classification. Gruendyke Mill Dam is classified as being small in size on the basis of storage at the dam crest of 51 acre-feet which is less than 1,000 acre-feet, but more than 50 acre-feet, and on the basis of its structural height of 12.0 feet, which is less than 40 feet, in accordance with criteria given in the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification. U.S. Route 46 crosses the Musconetcong River about 160 feet downstream of Gruendyke Mill Dam. Within 200-300 feet downstream of the bridge, three low-lying houses are 7-9 feet above the channel bottom. Failure of Gruendyke Mill Dam could cause 1-2 feet of flooding at the two lower houses, and could cause overtopping of the Route 46 bridge. Failure of Gruendyke Mill Dam could cause loss of less than a few lives and appreciable economic damage, which justifies a significant hazard classification.

e. Ownership. The dam is owned by Barod Enterprises c/o the Millstone Pumphouse Restaurant, Route 46, Hackettstown, NJ 08903.

f. Purpose. Gruendyke Mill Dam was originally built to supply water power for a mill. Presently it is being used for recreational purposes.

g. Design and Construction History. No design or construction data pertinent to Gruendyke Mill Dam were available.

h. Normal Operational Procedure. No operational procedures pertinent to Gruendyke Mill Dam were available.

i. Site Geology. No site specific geologic information (such as borings) was available at the time the dam was inspected. Information derived from the Geologic Map of New Jersey (Kummel and Johnson, 1912) and the Glacial Drift Map of New Jersey (Salisbury, Kummel, Peet and Whitson, 1902) indicates soils within the immediate site consist of stratified drift which may consist of sand and gravel plains, deltas, eskers, kames, and terraces.

The depth to bedrock at the dam site is unknown and outcrops were not observed during the dam inspection. The previously mentioned map indicates that bedrock in this area consists of massive to thin bedded limestones of Cambrian to Ordovician age.

1.3 Pertinent Data

a. Drainage Area

75.4 square miles

b. Discharge at Damsite (cfs)

Maximum flood at damsite - flood of record at U.S.G.S. gage 0145600, was 2,170 cfs on August 19, 1955. The gage is located upstream of Newburg Mill Dam on the Musconetcong River and has a drainage area of 70 square miles. The estimated maximum discharge at the damsite was, therefore, about 2,300 cfs.

Total ungated spillway capacity at high point of dam elevation of 527.4 - 2,518

c. Elevation (ft. above NGVD)

Top of dam - 526.3 (left abutment)
527.4 (right abutment)

Test Flood (100-year) - 527.8

Recreation pool (at time of inspection) - 523.7

Spillway crest - varies - average is 524

Streambed at centerline of spillway - 515.4

Maximum tailwater -- (F.I.S. 500 year flood) - 524.0

d. Reservoir (feet)

Length of maximum pool - 3360 (estimated)

Spillway crest - 2900

e. Storage (acre-feet)

Spillway crest - 21

Test Flood (100-year) - 56

Top of dam - 51

f. Reservoir Surface (acres)

Top of dam - 12.5 (estimated)

Spillway crest - 6.2

g. Dam

Type - Concrete and masonry gravity

Length - 138 feet

Height - 10.9' feet (hydraulic)

- 12.0' feet (structural)

Top width (spillway) - 2 feet

Side slopes - Vertical upstream and downstream

Zoning - unknown

Impervious core - unknown

Cutoff - unknown

Grout curtain - unknown

h. Spillway

Type - Broad-crested concrete free overflow spillway with a stone masonry vertical downstream face.

Length of weir - 115 feet (includes 5-foot stoplog section; see crest elevations below.)

Crest elevation varies - Average 524 feet

U/S Channel - Musconetcong River leading to Gruendyke Reservoir.

D/S Channel - Musconetcong River

i. Regulating Outlets

Type - Stoplog section, invert elevation 515.4' NGVD. All other outlets for former mill operation are inoperable or blocked.

Length - 5 feet in width x 6 feet in height (with present stoplogs in place).

Access - 29 feet from left end of dam; no lifting mechanism present.

SECTION 2 ENGINEERING DATA

2.1 Design

No original plans, hydraulic or hydrologic or other engineering data for Gruendyke Mill Dam were found. Correspondence concerning the dam from 1954 and 1957 were obtained from the files of the New Jersey Department of Environmental Protection and have been included in Appendix 1.

2.2 Construction

No data concerning the original construction of Gruendyke Mill Dam were disclosed.

2.3 Operation

No data pertaining to the operation of the dam were found.

2.4 Evaluation

- a. Availability. A search of the New Jersey Department of Environmental Protection files and contact with a representative of the owner of the dam revealed limited information. All available information was retrieved.
- b. Adequacy. Data retrieved was not adequate for an evaluation. However, the visual inspection data obtained is adequate to complete Phase I Inspection Report.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. Dam. Erosion has damaged the right and left abutments. The downstream training wall at the left abutment of the dam has been undermined and collapsed. The visible portions of the concrete spillway crest and downstream face are badly cracked and spalled. Water is leaking underneath and through the base foundation of the old raceway structure along the right side of the dam. Numerous small trees are growing in the channel adjacent to the raceway foundation. The left concrete abutment is badly deteriorated. A major vertical crack was observed near the center of the dam and a portion is missing.

b. Appurtenant Structures.

- (1) Stoplogs. A stoplog facility was partially visible under the water flowing over the left end of the dam. Both abutments of the spillway which are integral with the dam are badly deteriorated where visible.
- (2) Outlet Works. The original outlet works are abandoned and filled with silt. All gates appear to have been removed. The concrete structures are generally cracked and deteriorated. The outlet channel has been filled with earth, stones, and debris.

c. Reservoir Area. The watershed above the lake is gently sloping, slightly wooded and contains numerous homes. Some open fields exist along the left side of the reservoir. Slopes on the shore appear to be stable. Evidence of significant sedimentation, namely a low lying swampy area just upstream from the dam, was observed. Storage of water behind the dam has been reduced significantly by siltation.

d. Downstream Channel. Considerable erosion has occurred on the left bank of the channel immediately downstream of the spillway for a distance of approximately 100 feet. A vertical stone masonry wall forms the right bank of the channel for a distance from the dam to the downstream roadway bridge. Trees are growing on the banks of the channel downstream of the spillway.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

No formal operating procedures were revealed.

4.2 Maintenance of Dam

No formal maintenance procedures for the dam were found.

4.3 Maintenance of Operating Facilities

No formal maintenance procedures for the operating facilities were discovered.

4.4 Warning System

No description of any warning system was found.

4.5 Evaluation of Operational Adequacy

Because of the lack of formal operation and maintenance procedures, the remedial measures described in Section 7.2 should be implemented as described.

SECTION 5
HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data. Because no hydraulic or hydrologic data were revealed, an evaluation could not be performed.

b. Experience Data. No experience data were found indicating stages or flow at the dam. The flood of record at U.S.G.S. gage 01456000, on the Musconetcong River near Hackettstown, is 2,170 cfs. The drainage area at the gage is 70 square miles, compared to 75.4 square miles at the dam. The estimated maximum discharge at the damsite, based on the drainage area ratio, is 2,300 cfs.

c. Visual Observation. The spillway for Gruendyke Mill Dam consists of a 115-foot long, free overflow, concrete weir with a stone masonry downstream face. The downstream face of the spillway is severely cracked and eroded. Portions of the concrete weir are missing. Joints that were visible were badly spalled and eroded. Leakage was observed below the concrete cap stone on the dam and adjacent to the original headrace training walls.

The present regulating outlet consists of a single 5-foot stoplog bay at the left center of the dam (included as part of the spillway section). The concrete abutments to the stoplog section are badly eroded and spalled. Some debris and logs were collected on the stoplogs.

The original headrace and outlet works, situated on the right side of the dam, are filled in and abandoned. All gates are missing. Concrete surfaces are spalled and eroded.

d. Gruendyke Mill Dam Overtopping Potential. The hydraulic/hydrologic evaluation for the dam is based on a selected Spillway Design Flood (SDF) equal to the 100-year flood in accordance with the range of test floods given in the evaluation guidelines, for dams classified as significant hazard. The 100-year flood was taken from the Flood Insurance Study for the Township of Mt. Olive, New Jersey. In that study, the 100-year flood was determined from a Log-Pearson Type III distribution of stream gage records at Bloomsbury and Hackettstown, New Jersey, and at the outlet to Lake Hopatcong. Hydrologic computations are given in Appendix 4. The 100-year discharge for the subject watershed is 2,926 cfs. The spillway can pass 1490 cfs, 50.9% of the test flood, before the dam is overtopped. Thus, it is considered inadequate. From the visual inspection Gruendyke Mill Dam was considered a potential significant hazard. U.S. Route 46 bridge and three homes on either side of the river channel are located downstream from 200 to 300 feet below the dam. Flows resulting from the

failure of Gruendyke Mill Dam could cause overtopping of the bridge and slight flooding at the two lower houses. Dam failure could cause loss of less than a few lives and appreciable economic damage. Therefore, Gruendyke Mill Dam should be downgraded to a significant hazard classification.

e. Drawdown Capability. The average flow at U.S.G.S. gage 01456000 is 120 cfs. The 5-foot stop-log section could convey this flow with a water surface elevation of about 519.4' NGVD. Thus removing stoplogs would only lower the pool by 2 feet under average flow conditions. Under these conditions, the reservoir could be lowered 2 feet in about 4 hours.

SECTION 6 STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

The erosion at the right and left abutments, if allowed to continue, could result in the eventual breaching of the dam. Especially significant is the collapse downstream of the left spillway training wall.

The erosion and seepage at the foundation of the former raceway structures could contribute to future stability problems for these structures, if allowed to continue.

Continued deterioration of the concrete spillway weirs could contribute to future instability for these structures if allowed to continue.

6.2 Design and Construction Data

No design or construction data pertinent to the structural stability of the dam are available.

6.3 Operating Records

No operating records pertinent to the structural stability of the dam were available.

6.4 Post-Construction Changes

No record of post-construction changes was available.

6.5 Seismic Stability

This dam is in Seismic Zone 1. According to the Recommended Guidelines, dams located in Seismic Zone 1 "may be assumed to present no hazard from earthquake provided static stability conditions are satisfactory and conventional safety margins exist." None of the visual observations made during the inspection are indicative of an unstable structure, although the structure is deteriorating through lack of maintenance. However, because no data are available concerning the engineering properties of the structure and foundation materials for this dam, it is not possible to make an engineering evaluation of the stability of the structure or the factor of safety under static conditions.

SECTION 7
ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. Gruendyke Mill Dam is about 70 years old and is in poor overall condition.

b. Adequacy of Information. The information available is such that the assessment of the dam must be based primarily on the results of the visual inspection.

c. Urgency. The recommendations made in 7.2.a and 7.2.b should be implemented by the owner as prescribed.

d. Necessity for Additional Data/Evaluation. The information available from the visual inspection is adequate to identify the potential problems which are listed in 7.2.a. These problems require the attention of a professional engineer who will have to make additional engineering studies to design or specify remedial measures to rectify the problems. If left unattended, the problems could lead to failure of the dam.

7.2 Recommendation/Remedial Measures

a. Recommendations

The owner should engage a professional engineer qualified in the design and construction of dams to do the following, beginning soon:

- (1) Design and oversee reconstruction of the dam, and appurtenant structures. Attention should be paid to increasing spillway capacity and to provide more adequate drawdown capacity.
- (2) Repair erosion at right and left abutments.
- (3) Design and specify repairs for collapsed sections of the spillway training wall at the left side of the dam.
- (4) Remove trees and their roots from the area adjacent to the former raceway structure.
- (5) Evaluate seepage adjacent to the foundation of the former raceway structure and design remedial measures, as needed.

b. Alternatives. If continuation of the aesthetic and recreational aspects of the dam and reservoir are desired, no alternative is recommended. Otherwise, breaching, under proper supervision and in accord with New Jersey regulations concerning breaching, should be considered.

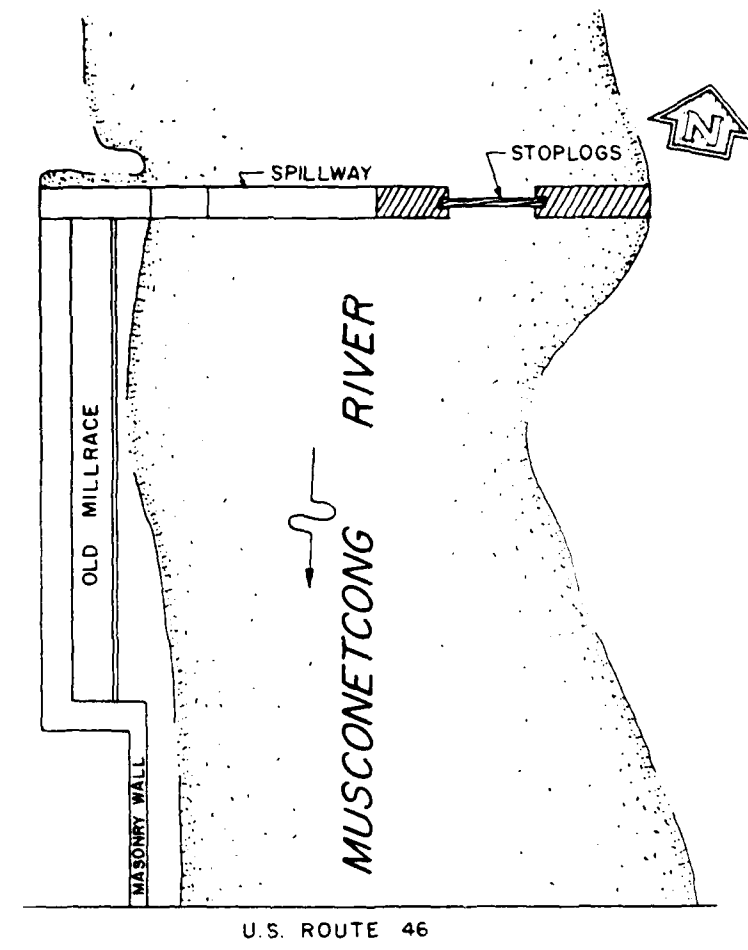
c. Operating and Maintenance Procedures

Beginning soon:

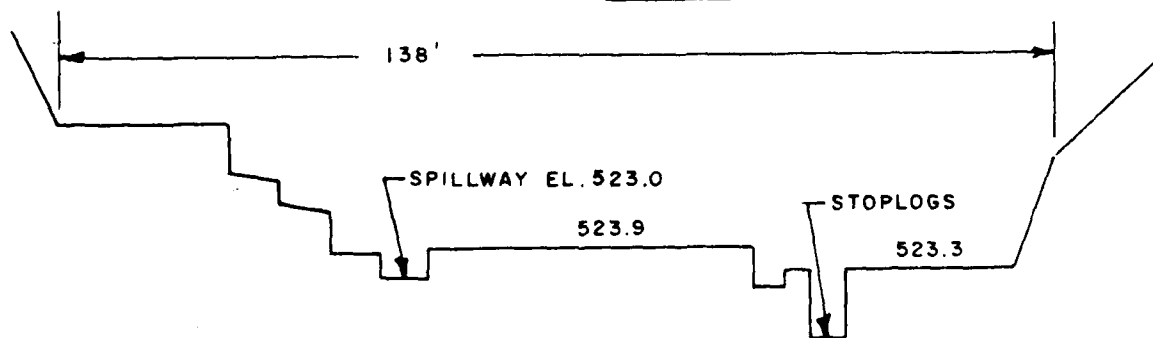
- (1) Start a program of checking the condition of the dam periodically.
- (2) Develop an emergency action plan which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam.

In the near future:

- (1) Clear trees and brush from the discharge channel and from a zone 15 feet wide on either side of the discharge channel for a distance of 100 feet downstream from the toe of the dam or to the limits of the property whichever is the lesser distance.
- (2) Develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.



PLAN



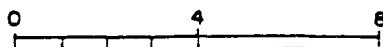
ELEVATION

Anderson-Nichols & Co, Inc		U.S. ARMY ENGINEER DIST PHILADELPHIA	
BOSTON		CORPS OF ENGINEERS	
MASSACHUSETTS		PHILADELPHIA, PA	
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS			
GRUENDYKE MILL DAM			
MUSCONETCONG RIVER		NEW JERSEY	
		SCALE: NOT TO SCALE	
		DATE: JUNE 1981	

FIGURE-1



SCALE IN MILES



MAP BASED ON STATE OF NEW JERSEY
OFFICIAL MAP & GUIDE.

Anderson-Nichols & Co., Inc.		U.S. ARMY ENGINEER DIST. PHILADELPHIA	
BOSTON		CORPS OF ENGINEERS	
MASSACHUSETTS		PHILADELPHIA, PA.	
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS			
GRUENDYKE MILL DAM			
LOCATION MAP			
MUSCONETCONG RIVER		NEW JERSEY	
		SCALE: 1" = 4 Miles Approx.	
		DATE: JUNE 1981	

APPENDIX 1

ENGINEERING AND EXPERIENCE DATA

GRUENDYKE MILL DAM

May 11, 1957

Mr. Leigh A. Lott, Superintendent
Hackensack Public Schools
Hackensack, New Jersey

Re: Bay St. Michael's Church

Dear Mr. Lott:

This is in reply to your letter of May 3, 1957 relative to the dam known as
Greenaway's Mill Pond across the Hackensack River immediately upstream of Route
No. 46 in the Borough of Hackensack, Bergen County.

An inspection was made of this dam by an engineering representative of our
Division of Water Policy and Supply in company with Mr. E. Scellie on April 17,
1957. Mr. Scellie posed several questions, the answers to which might have been
bearing on a possible sale on all or a portion of his property to a future buyer.
In response to Mr. Scellie's questions, he was advised by the Division of Water
Policy and Supply as follows:

There will be no objection to the lowering of the spillway or the
removal of same in its entirety provided that all masonry and debris
be removed from the channel of the Hackensack River upon completion
of the work.

He was also advised that an application for the filling in of the
present pond and the establishment of an adequate stream channel
through the filled area could be favorably considered upon the sub-
mission of a formal application for same.

He was further advised that there would be no objection to the
filling in of the former roadway at the easterly end of the flood
plain if the spillway is removed.

Mr. Scellie stated that he had no immediate plans for any of this work but
was merely seeking information which, as indicated above, might have been bearing
on the sale of his property. However, in response to the request made in the last
sentence of your letter, no action in this matter will be taken by the Division
of Water Policy and Supply until the Board of Advection has had an opportunity to
object and prevent its case to the Water Policy and Supply Council. You will be
so advised at the appropriate time.

Very truly yours,

Joseph E. Nelson
Commissioner

ENCLOSURE

HACKETTSTOWN PUBLIC SCHOOLS
Hackettstown, New Jersey

LEIGH M. LOTT
Superintendent

May 3, 1957

Dr. Joseph E. McClean, Commissioner
State Department of Conservation and Economic Development
Trenton, New Jersey

Dear Dr. McClean:

It has been brought to the attention of the Hackettstown Board of Education that Mr. B. Moella, owner of the Youngblood or Grandyne Mill and Dam across the Musconetcong River in Hackettstown, has applied to state authorities for permission to abandon or destroy this dam.

For many years this dam has created the waters of the Grandyne Mill Pond and has backed the water up in the Musconetcong River for a considerable distance. More than 50 years ago, the Hackettstown Board of Education took advantage of this situation and created a swimming site, a beach, and a recreation playground along the river where the water has been backed up by the dam. Each year the Board of Education employs three individuals for the summer to supervise this bathing and recreational program provided by these facilities. We have attendance figures during the summer months at the Sandbar to prove that the several hundred children, families, or individual adults use this area each pleasant summer day for recreational purposes.

The destruction of the dam would lower the water to such an extent that it would be impossible to continue the waterfront activities that the people of Hackettstown and of the Hackettstown area have enjoyed for all of these years. For this reason, the Hackettstown board of Education requests you not to approve Mr. Moella's application until such time as the board of Education has had an opportunity to thoroughly present its case to you. Consideration of this request on your part will be very much appreciated.

Yours very truly,

Leigh M. Lott
Superintendent

LM:Lrf

Report on Dam Inspection:

Granddyke's Mill Pond
Dam No. 24-24
Muscumetong River
Rackettsstown - Warren County

An inspection was made of the subject dam on April 17, 1957
in company with the owner, Mr. B. Nocella.

The inspection was made as a result of an inquiry from Mr.
Nocella relative to possible changes in the structure and lake bottom.
The three questions which he raised were as follows:

(1) Will there be any objection by this Division to the
lowering or removal of the spillway? The writer told him
that there will be no objection provided no masonry or
debris was left in the stream channel after the work was
completed.

(2) Mr. Nocella wished to know whether the lake bottom could
be reclaimed and filled in with the understanding that the
original stream channel would be preserved. The writer in-
formed him that there would be no objection to the reclama-
tion of these lands provided an application was submitted by
this Division for the fills adjacent to the channel which must
be established in cross-section and distance between encroach-
ment lines in accordance with the requirements of this Division.

(3) He also requested permission to fill in the old raceway at
the left or easterly side of the spillway. The writer withheld
judgment on this matter. The old raceway is now blocked by a
concrete wall with some fill downstream. A 48-inch pipe opening
with hand gates has been provided in this wall to supplement the
capacity of the stop logs in the main gate, should it become nec-
essary to empty the pond during times other than periods of low
flow. The bridge over Route 46 downstream of this raceway struc-
ture has a span estimated at 15 feet.

It is the writer's opinion that permission to fill in the raceway could be
granted if the spillway is removed, but that such permission should be withheld
in case the dam and spillway remain in their present condition. The reason for
this is that the concrete wall referred to above will also act as a flood spill-
way during times of flood, although there are no end walls to protect adjacent
lands from erosion.

4/23/57

W. C. Wittwer
Norman C. Wittwer

RECEIVED
MAY 1 1957
POLICE & SUPPLY

FIELD OFFICE - COLUMBUS, OHIO

MARCH 27 1957

170
Dept. of Soil and Conservation
Land Reclamation Division
Tombon N. J.

Gentlemen:

I would like some information concerning the following location
in Lockatstown N. J.

The location is known as Youngblood's pond or Gruenke's mill
on the North side of Route 60 in Lockatstown N. J. where the
Muscogee River crosses Route 60.

I anticipate making some improvements and would like to know
whether I can permanently remove the gates from the dam so that
the pond bottom can dry up so that the muck can be removed.
Waterpower is no longer being used here so the reservoir will be
filled in. There will no longer be any use for the Silversay
about 200 feet east of the Muscogee River which also crosses
Route 60. I would like to know whether this can be filled in
and also what course and width should be left on the river as
I would like to fill in the pond. I can also remove the dam if
it is necessary to allow a free flow of water in the river.
I would appreciate having the present commerce of the river
at this location if you have the information available.

Yours truly

E. H. H. H.
E. H. H. H.

2m No 24-24
4/1/57

Report on Dam Inspection

GRUENDYKE MILL DAM (Dam 24-24)

HACKETTSTOWN - MORRIS COUNTY

On November 4, 1954, the undersigned made an inspection of the subject dam and pond accompanied by Mr. S. Nocella. The inspection was made at the request of Mr. Nocella, who, with his father, owns the mill, dam, pond and property adjacent to the pond fronting on U.S. Route 46.

The owners have sold the mill and it is understood that the purchasers do not desire to retain the water rights at the site. The Town of Hackettstown has been permitted to maintain the dam in order to keep a suitable pond level for swimming purposes. Mr. Nocella proposes now to fill in about 1.5 acres of the pond near the highway in order to provide space for several commercial buildings. This fill, as proposed, will cover an auxiliary channel located against the left valley wall and dug, according to Mr. Nocella, by the original owners of the dam.

The inspection revealed that the spillway and mill are both in a state of ill repair. The mill is being used for ice manufacture, and according to Mr. Nocella the turbine and generator in it are still useable although they are not intended for future use. The dam has one stop-logged sluiceway about 35 feet from the left abutment. It is inaccessible except during times of extreme low flow. The concrete in the section is badly eroded, and there has been piled against the downstream face, obviously by bulldozer, heaps of stream-bed rubble. Mr. Nocella explained that the town had this work done during the summer in order to close a number of leaks in the dam. He also said that the town has had to place a quantity of concrete against the upstream face in order to stop one particularly bad leak. The work done apparently has been the result of haphazard attempts to achieve temporary results rather than overall improvement of the structure.

The earth-fill portion is a continuous fill extending upstream about 100 feet from the highway. Some new material has been added and spread about, but this appears to have been done to raise the grade of the entire fill rather than increase the extent of it.

An auxiliary channel, mentioned above, extends under the highway and empties into the main river channel about 500 feet downstream. The spillway is a concrete wall section with its crest set about 2.0 feet above that of the main spillway. A large sluice pipe extends through it, but the gate seems to be inoperative at the present time.

Pictures of pertinent parts of the development are attached.

It was explained to Mr. Nocella that this Division has jurisdiction over the type of encroachment he proposes. He was advised to hire a competent engineer to prepare a map of the area concerned and show the extent of the work to be done. Encroachment application blanks will be sent to Mr. Nocella.

W. E. Edens
William E. Edens
Senior Hydraulic Engineer

Trenton, N. J.
November 8, 1954

October 26, 1914

Mr. A. Reville
Box 64
Buckingham, N. J.

Dear Sir:

This is in answer to your letter of October 16, directed to the Department of Conservation of the State House Annex.

In regard to the work you propose at the Cranbury Mill Pond on the Musconetcong River in Rackettsstown, N. J., Mr. William E. Adams of this office will come to Rackettsstown on Thursday, November 4. If it will be convenient with you, he will meet you near the dam at about 11:00 a.m. to inspect the site and discuss the work you propose.

If the above-mentioned date will not be satisfactory, please reply at your earliest convenience proposing a more suitable one.

Very truly yours,

H. T. Critchlow
Director and Chief Engineer

Sept. 1
1st
trails

Keats

Change
Brown

River

Engine

Woods

Change

Box #86

Henry Nf

Oct 16, 1954

Dept. of Conservation

State House Annex

Division of Water Policy & Supply

Letter 7, Nf

From	To	Remarks
C. N. E. L. L.	C. N. E. L. L.	C. N. E. L. L.

Dear Sir:

I would like to make some alterations and changes on a mill pond that was formerly known as Sherwood Mill on the Muscatine River in Buckettown, Nf.

Would it be possible to have one of your engineers call on me and advise me on the proper procedure and if it is permissible to make the change I have in mind?

Yours Truly,
L. M. L.



1-710

MUSCAETONG RIVER

DAMS IN NEW JERSEY - REFERENCE DATA No. 24-24

Name of Owner: F. R. Grumdyke Address: Easton
 Name of Dam: Grumdyke Mill County: Mercer Location: 24.3.9.54
 CONSTRUCTION: Date: By whom:
 Stream: Muscononge River Tributary to: Delaware River
 DRAINAGE BASIN: Area: 72.7 sq. mi. Description:
 Description of valley below dam:
 DAMAGE FROM FAILURE: Probable
 Previous (date):
 Purpose: Water power 102,500 gals. Type: Concrete and earth embankment
 Foundation:
 Length: 450 ft. Max. height: 6 ft. Max. width of base: 6 ft.
 Upstream slope: Downstream slope: Length: 70 ft. Cu. yds.
 SPILLWAY: Type: Concrete overflow Depth below top of abutment: 1.9 ft. Capacity: 6 c.f.s. per sq. ft.
 RESERVOIR: Capacity: still pool Area: acres Length: ft.
 Outlet: 2 timber sluice gates 8-1/2' high; total length 8.5'; 2 gates at 1.1 and 1.1
 Remarks: 9.5' lead; 1.1' turbine 50 h.p. ago
 Source of data: W. J. C. inspection on ground Date: 5/1/23

APPENDIX 2

CHECK LIST

VISUAL INSPECTION

GRUENDYKE MILL DAM

Check List
Visual Inspection
Phase 1

Name Dam Gruendyke Mill County Warren State NJ (00793) Coordinators NJDEP
 Date(s) Inspection 2-19-81 4-21-81 Weather Cool Clear, cold Temperature 40° 38°
 Pool Elevation at Time of Inspection 525.3' NGVD Tailwater at Time of Inspection 519.6' NGVD

Inspection Personnel:

<u>J. Stone</u>	<u>S. Gilman</u>
<u>W. Guinan</u>	<u>R. Murdock</u>
<u></u>	<u></u>

J. Stone/S. Gilman Recorder

Owner was not present during inspection

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEEPAGE OR LEAKAGE	Leakage below concrete cap stone on the dam, also adjacent to outlet work training walls.	Major repairs required
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Erosion on both sides of the dam adjacent to abutments.	Repair erosion
DRAINS	None observed	
WATER PASSAGES	Not applicable	
FOUNDATION	No evidence of foundation conditions	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Severe cracking and erosion of d/s face of spillway. Top of concrete (1 foot ±) is missing at left end of dam and near right end. Several through wall leaks were observed.	Major reconstruction required
STRUCTURAL CRACKING	Major cracks at left abutment which indicates movement.	
VERTICAL AND HORIZONTAL ALIGNMENT	Poor - top of concrete weir is irregular - portions missing.	
MONOLITH JOINTS	None observed	
CONSTRUCTION JOINTS	Joints that are visible are badly spalled and eroded.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Severe cracking and spalling of all concrete walls.	Repair concrete walls
INTAKE STRUCTURE	Concrete is spalled and eroded. U/s channel filled with debris.	Repair concrete
OUTLET PIPE	Not applicable	
OUTLET CHANNEL	Completely filled in - abandoned	
EMERGENCY GATE	All gates are missing	Refit with new gates

GATED SPILLWAY
(Stop Log Section)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Not visible Abutments to stop log section are badly eroded and spalled.	Repair abutments
APPROACH CHANNEL	Filled with sedimentation and debris.	
DISCHARGE CHANNEL	Unobstructed	
BRIDGE AND PIERS	Not applicable	
GATES AND OPERATION EQUIPMENT	Not visible - some debris and logs collected on stop logs.	Clear debris

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Lightly wooded, open field, house present.	
SEDIMENTATION	Appears to be sediment in the reservoir.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF

OBSERVATIONS

REMARKS OR RECOMMENDATIONS

CONDITION

(OBSTRUCTIONS,
DEBRIS, ETC.)

Trees, logs, debris, numerous stones
and boulders, trees overhanging banks.

SLOPES

Gentle. Considerable erosion has occurred
on the left bank of the channel immediately
downstream of the spillway for a distance
of approximately 100 feet.

Repair erosion

APPROXIMATE NO. OF HOMES AND POPULATION

3-5 low-lying homes.

Significant hazard

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	None found
REGIONAL VICINITY MAP	Prepared for this report
CONSTRUCTION HISTORY	None found
TYPICAL SECTIONS OF DAM	None found
HYDROLOGIC/HYDRAULIC DATA	None found
OUTLETS - PLAN	
- DETAILS	None found
- CONSTRAINTS	
- DISCHARGE RATINGS	
RAINFALL/RESERVOIR RECORDS	None found

ITEM	REMARKS
DESIGN REPORTS	None found
GEOLOGY REPORTS	None found
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None found
26	
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None found
POST-CONSTRUCTION SURVEYS OF DAM	None found
BORROW SOURCES	Unknown

ITEM	REMARKS
MONITORING SYSTEMS	None found
MODIFICATIONS	None found
HIGH POOL RECORDS	None found
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None found
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None found
MAINTENANCE OPERATION RECORDS	None found

ITEMS	REMARKS
PILLWAY PLAN	
SECTIONS	None found
DETAILS	
OPERATING EQUIPMENT LANS & DETAILS	None found

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 75.4 square miles, gentle slope,
lightly wooded, residential

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 524' NGVD
(average (21 acre-feet))

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY) _____
Not applicable

ELEVATION MAXIMUM TEST FLOOD: 527.8' NGVD (100-year)

ELEVATION TOP DAM: left abutment 526.3' NGVD; right abutment
527.4' NGVD

SPILLWAY CREST: Concrete free overflow

a. Elevation Varies: 524' NGVD-average

b. Type Broad crested with stone masonry vertical down-
stream face

c. Width 2 feet

d. Length 115 feet

e. Location Spillover Center of dam

f. Number and Type of Gates None

STOPLOG SECTION:

a. Type one 5-foot long stoplog bay

b. Location left center of dam

c. Elevation 515.4' NGVD

HYDROMETEOROLOGICAL GAGES: One USGS #1456000

a. Type Continuous stage-discharge recording

b. Location Upstream of Saxton Falls Dam, 3 miles up-
stream of Gruendyke Mill Dam

c. Records August 19, 1923 to present

MAXIMUM NON-DAMAGING DISCHARGE: 1,490 cfs

APPENDIX 3

PHOTOGRAPHS

GRUENDYKE MILL DAM



April 21, 1981

View of upstream face of dam from left abutment.



February 19, 1981

View standing on wall on right (west) side of dam
looking at overflow section on right side.



February 19, 1981

Right bank looking u/s at old mill structure foundation



February 19, 1981

Downstream left bank looking at dam u/s toward right side



February 19, 1981

View of d/s right bank looking u/s



February 19, 1981

View of d/s left bank looking u/s



April 21, 1981

View of erosion adjacent to left abutment



April 21, 1981

View of right side of dam adjacent to waterway structure.



February 19, 1981

Upstream reservoir area



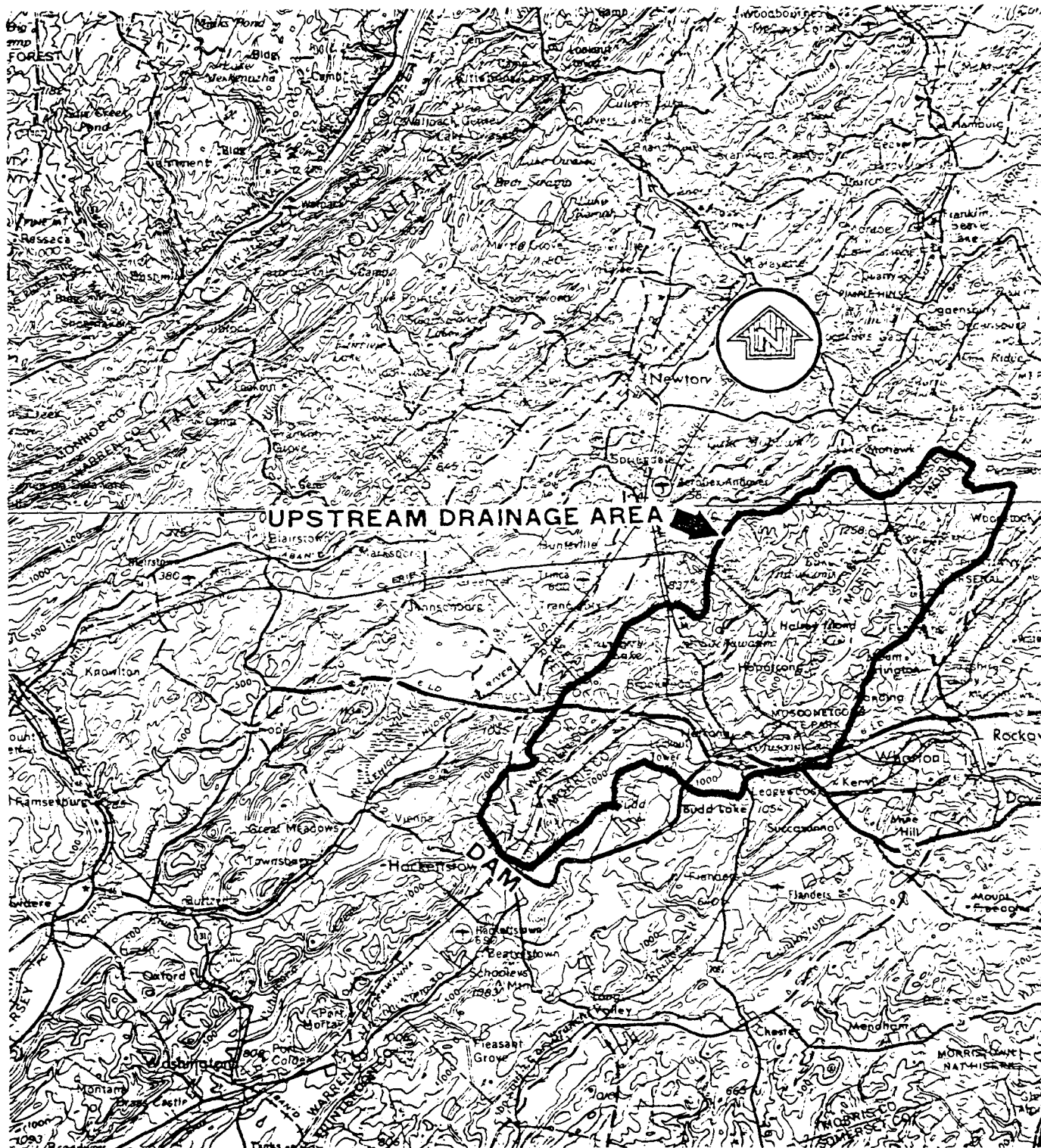
February 19, 1981

Looking d/s from d/s side of Rte 46 bridge at d/s channel

APPENDIX 4

HYDROLOGIC COMPUTATIONS

GRUENDYKE MILL DAM



**NATIONAL PROGRAM OF INSPECTION OF
NON-FED. DAMS**

GRUENDYKE MILL DAM

HACKETTSTOWN TOWN, NEW JERSEY

REGIONAL VICINITY MAP

JUNE 1981

**DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA**

SCALE IN MILES

0 10 20

MAP BASED ON U.S.G.S. 1:250,000 SERIES SHEET
NK 18-8 SCRANTON, PA., N.Y., N.J. 1962, REVISED
1976, AND NK 18-11 NEWARK, N.J., PA., N.Y. 1944,
REVISED 1969.

JOB NO.

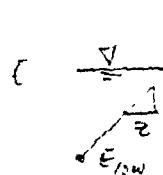
SQUARES
1/4 IN. SCALE

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Stage Vs. DischargeTop of Dam (sections ①, ②, ③) $C = 2.6$ (earth weirs)① below 526.3, $Q_1 = 0$ * 526.3 to 529.2: $Q_1 = 2.6 (5.5) (E - 526.3) (0.5(E - 526.3))^{3/2}$ * above 529.2: $Q_1 = 2.6 (16) (E - 527.75)^{3/2}$ ② $Q_2 = 2.6 (18) (E - 527.4)^{3/2}$ ③ * below 527.4, $Q_3 = 0$ * 527.4 to 533.4, $Q_3 = 2.6 (2.5) (E - 527.4) (0.5(E - 527.4))^{3/2}$ Spillway Crest (sections ②, ③, ④, ⑤, ⑥, ⑦, ⑧, ⑨, ⑩, ⑪) $C = 3.0$ (concrete weirs)② below 523.2 $Q_2 = 0$ * 523.2 to 526.3 $Q_2 = 3.0 (1.61) (E - 523.2) (0.5(E - 523.2))^{3/2}$ * above 526.3 $Q_2 = 3.0 (5) (E - 524.75)^{3/2}$ ③ * $Q_3 = 3.0 (24) (E - 523.25)^{3/2}$ ④ $Q_4 = 3.0 (5) (E - 521.4)^{3/2}$ ⑤ $Q_5 = 3.0 (3) (E - 523.3)^{3/2}$ ⑥ * $Q_6 = 3.0 (5) (E - 527.75)^{3/2}$ ⑦ $Q_7 = 3.0 (45) (E - 523.9)^{3/2}$ ⑧ * $Q_8 = 3.0 (7) (E - 523.05)^{3/2}$ ⑨ $Q_9 = 3.0 (7) (E - 523.7)^{3/2}$ ⑩ $Q_{10} = 3.0 (7) (E - 525)^{3/2}$ ⑪ * $Q_{11} = 3.0 (12) (E - 525.55)^{3/2}$

* For a sloping weir:

partially submerged

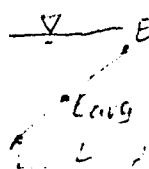


$$Q = CL^{3/2}; L = 2(E - E_{low})$$

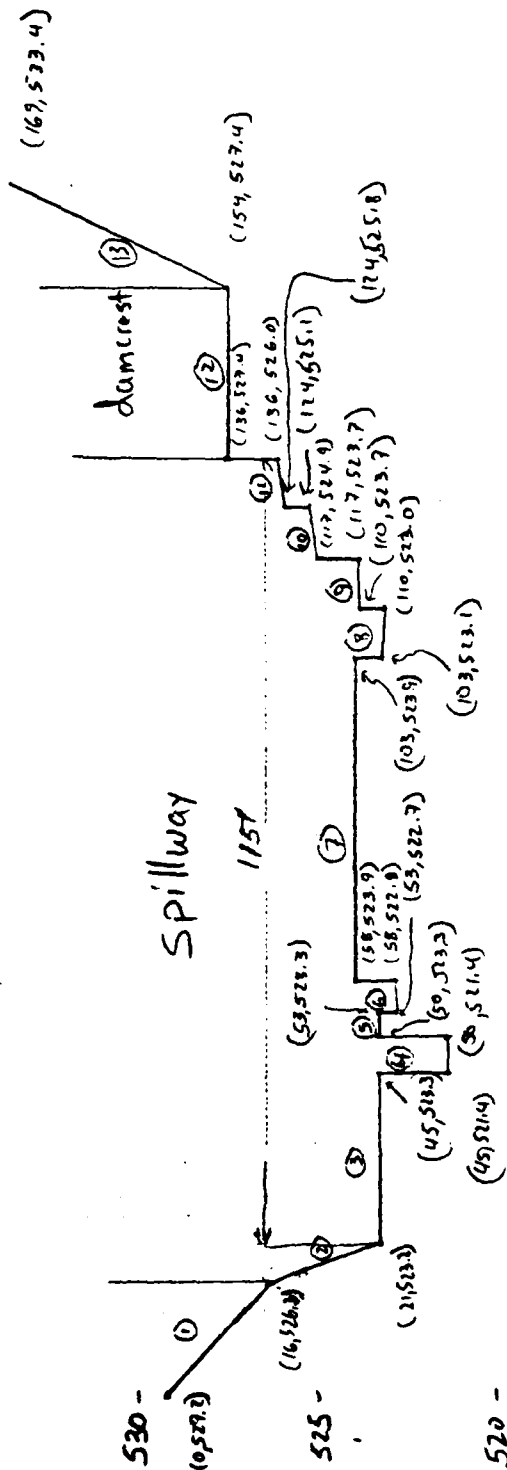
$$L = 0.5(E - E_{low})$$

$$Q = C(2)(E - E_{low})(0.5(E - E_{low}))^{3/2}$$

fully submerged



$$Q = CL^{3/2} = CL(E - E_{low})^{3/2}$$



ANDERSON-NICHOLS

VERNON BOSTON CONCORD

X-section at Gruendyke Mill Dam
COE 6/4/76 survey.

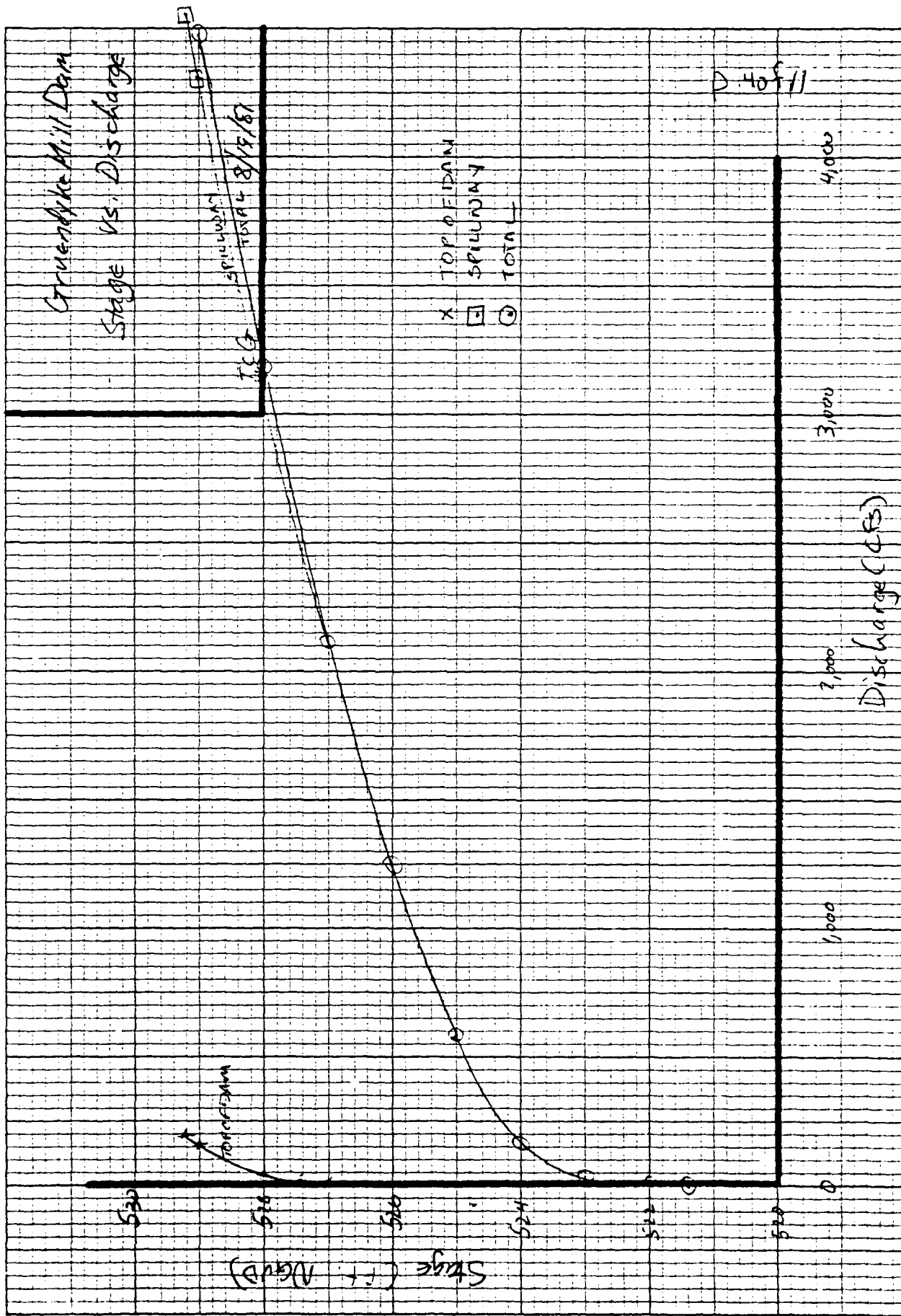
DATE: 8/19/81 SCALE: JOB NO. SHEET NO. P. 2 of 10

Subject Grundyke Mill

Sheet No. 5 of 11
Date 8/15/81
Computed TLG
Checked ELS

SQUARES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1/4 IN. SCALE

E (New)	Top of Dam (cfs)			Spillway Q (cfs)											Total (cfs)
	1	12	13	Total	2	3	4	5	6	7	8	9	10	11	
5214	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
522	0	0	0	0	0	0	7	0	0	0	0	0	0	0	7
5225	0	0	0	0	0	0	17	0	0	0	0	0	0	0	17
523	0	0	0	0	0	0	30	0	2	0	0	0	0	0	30
524	0	0	0	0	1	47	63	5	21	4	19	3	0	0	104
525	0	0	0	0	7	167	102	20	51	156	57	31	0	0	591
526	0	0	0	0	22	328	148	40	88	411	106	73	21	11	1,248
5263	0	0	0	0	29	384	163	47	100	502	123	88	31	23	1,490
527	2	0	0	2	51	523	199	64	131	737	165	126	59	63	2,120
5274	6	0	0	6	65	609	226	75	150	884	191	149	78	91	2,518
528	19	22	1	42	88	745	254	92	180	1,121	231	197	109	138	3,187
529	61	95	7	163	131	793	314	122	234	1,555	305	256	168	231	4,472
529.2	72	113	10	195	141	1045	327	129	246	1,647	320	271	181	251	4,753



JOB NO.

SQUARES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1/4 IN. SCALEStorage and surface area (see FIS profile, p 6)to 520.3

$$\frac{1}{2} (520.3 \overset{1.7}{\nearrow} 518.6) \times 20 = 17$$

$$(520.3 \overset{1.7}{\nearrow} 518.6) \times 30 = \frac{51}{68 \text{ ft}}$$

AVE. WIDTH FROM 200' SCALE PLANS

$$\frac{68 \text{ ft} \times 150'}{43,560 \text{ ft}^2/\text{Ac}} = 0.23 \text{ Ac-ft}$$

$$\text{SURFACE AREA (SA)} = \frac{150' \times 50'}{43,560 \text{ ft}^2/\text{Ac}} = \underline{0.17 \text{ Ac}}$$

to 521

$$\frac{1}{2} (521 \overset{.7}{\nearrow} 520.3) (50 \overset{805}{\nearrow} 755) = 281.8 \text{ ft}$$

$$\frac{281.8 \text{ ft} \times 300'}{43,560} = \underline{1.94 \text{ Ac-ft}}$$

$$\text{SA} = \frac{0.17 + 300' \times 755'}{43,560} = \underline{5.37 \text{ Ac}}$$

to 523

$$\frac{1}{2} (523 \overset{2}{\nearrow} 521) (2240 + 755) = 2995 \text{ ft}$$

$$\frac{2995 \times 120'}{43,560} = \underline{8.25 \text{ Ac-ft}}$$

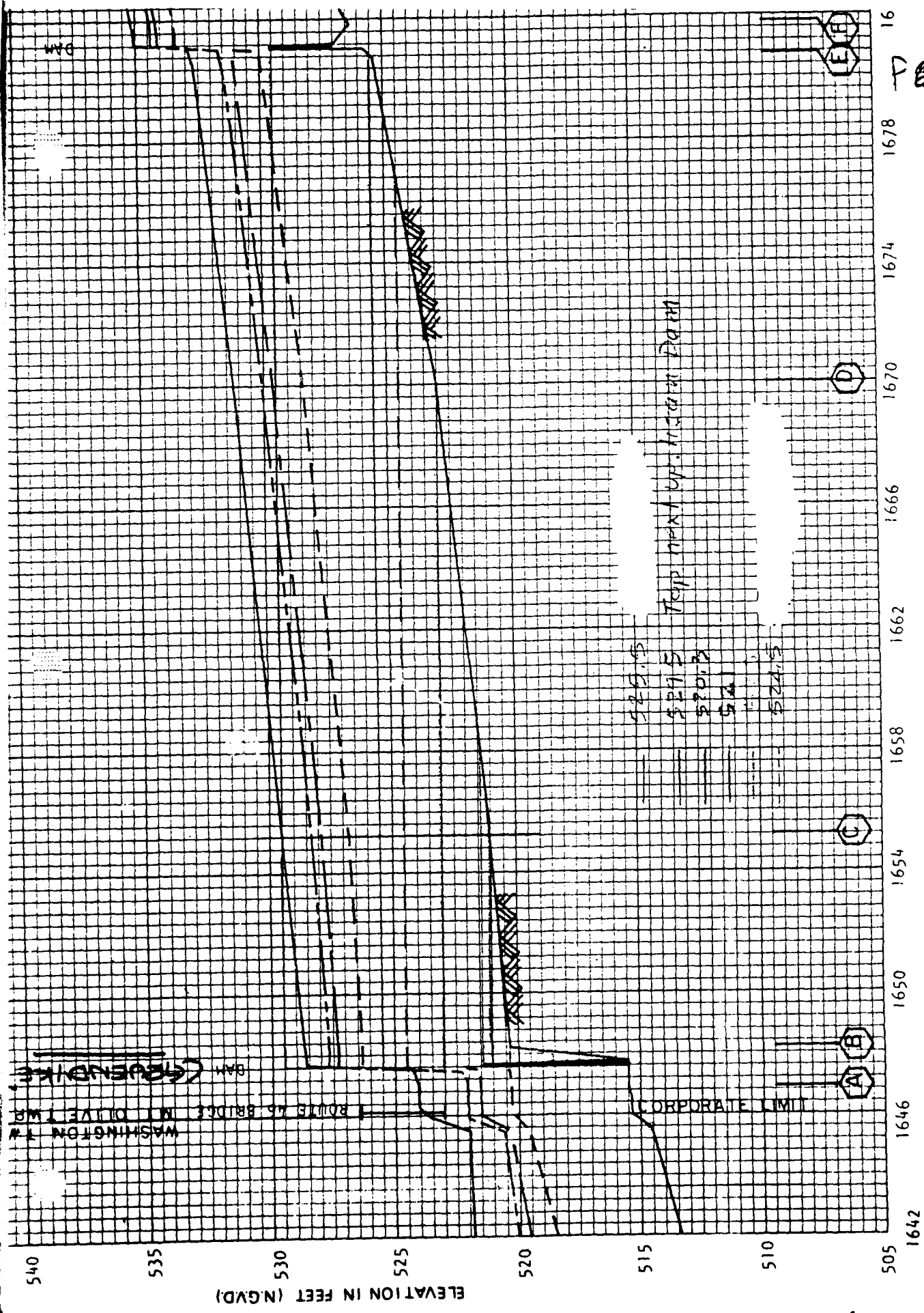
$$\text{SA} = \frac{120' (1485)}{43,560} + 5.37 = \underline{9.46 \text{ Ac}}$$

to 524.5

$$\frac{1}{2} (524.5 \overset{1.5}{\nearrow} 523) (2240 + 2910) = 3863 \text{ ft}$$

$$\frac{3863 \times 120'}{43,560} = \underline{10.64 \text{ Ac-ft}}$$

$$\text{SA} = 9.46 + \frac{670 \times 120}{43,560} = \underline{11.31 \text{ Ac}}$$



STATIONING IN HUNDREDS OF FEET ABOVE MOUTH

1642 1646 1650 1654 1658 1662 1666 1670 1674 1678 1682

A B

C

D

E

F

Top next up. High Dam

529.5
529.5
520.3
521
522.5

CORPORATE LIMIT

ELEVATION IN FEET (NGVD)

7 of 11

JOB NO.

SQUARES
1/4 IN. SCALE

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

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to 525.5

$$\frac{1}{2} (525.5 \overset{1.0}{\nearrow} 524.5) (2910 + 3310) = 3110 \text{ ft}$$

$$\frac{3310 \times 120'}{43,560} = \underline{8.57 \text{ Ac-Ft}}$$

$$SA = 11.31 + \frac{400(120)}{43,560} = \underline{12.41 \text{ Ac}}$$

to 529.5

$$\frac{1}{2} (529.5 \overset{4.0}{\nearrow} 525.5) (3310 + 3340) = 13,300 \text{ ft}$$

$$\frac{13,300 (150')}{43,560} = \underline{45.80 \text{ Ac-Ft}}$$

$$SA = 12.41 + \frac{30(150)}{43,560} = \underline{12.51 \text{ Ac}}$$

JOB NO.

SQUARES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1/4 IN. SCALE- SUMMARY - STORAGE - ELEVATION DATA

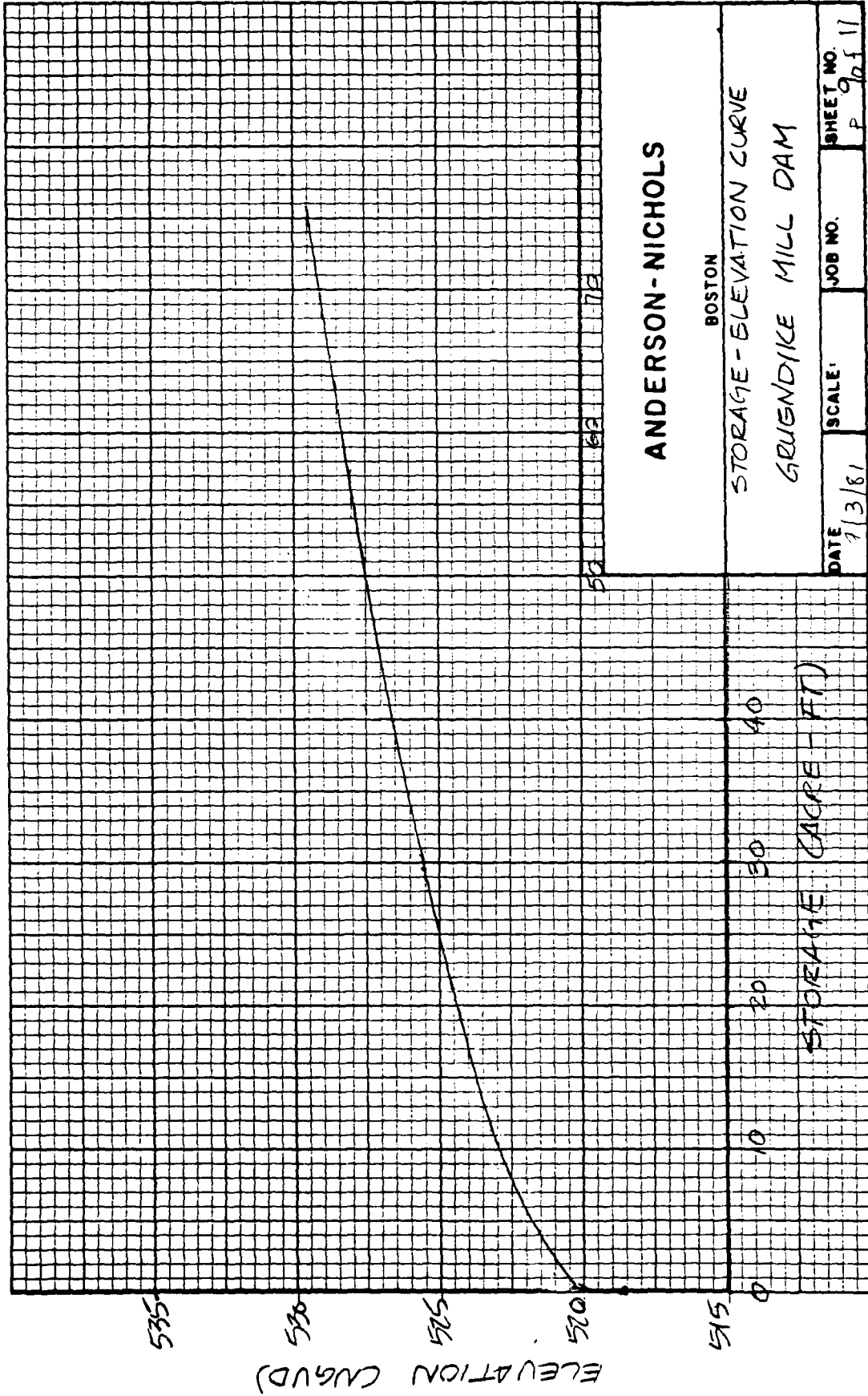
DESCRIP.	ELEV. (NGVD)	SURFACE AREA (AC)	STORAGE (AC-FT)	
			"Δ"	Total
4/5 INV	515.5	—	0.23	0
	520.3	0.17	1.94	0.23
	521.0	5.4	8.25	2.17
	523	9.5	10.64	10.42
	524.5	11.3	8.57	21.06
	525.5	12.4	45.80	29.63
Top of next upstream Dam	529.5	12.5		75.43

ave. spillway: 524 = 21 ac-ft

526.3 = 38 ac-ft

527.4 = 51 ac-ft

527.8 = 56 ac-ft



JOB NO. 3670-03SQUARES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1/4 IN. SCALETEST Flood Analysis

100-year flood is the test flood. From the F15,
 100 yr flood = 2926 cfs. This would cause a
 stage of 527.8 ft. NGVD and storage of
 53 acre-feet. (53 acre-ft = 0.013" of rain over
 75.4 sq. mi = negligible). Test flood is 1.5 feet
 above low point on top of dam.

The dam could pass $\frac{1490}{2926} \times 100 = 50.9\%$
 of the test flood without overtopping.

JOB NO. 3670-03SQUARES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1/4 IN. SCALEDRAWDOWN CAPABILITY

Assume Pond full to 524' NGVD

524' NGVD = AVE SPILLWAY ELEVATION

3.6 @ 524' = 21 ACRES

515.4' = IN. VERT. OF STOPLOGS

519.4' = elev. of normal flow

$$Q = 120 = 3 \times 5' \times 4^{3/2} \text{ cfs}$$

$$\begin{array}{r} 524.0' \\ 519.4' \\ \hline 4.6' \end{array} \quad \begin{array}{r} 524.0' \\ 515.4' \\ \hline 8.6' \text{ HEAD} \end{array}$$

$$\begin{array}{r} 8.6' \\ 4.6' \\ \hline 13.2' \end{array} \div 2 = 6.6' \text{ AVE HEAD}$$

$$Q = 3 \times 5' \times (6.6')^{3/2} = 254.3 \text{ cfs}$$

254.3 cfs

120.0 inflow (cfs)

134.3 cfs drained from storage

Assume Δ storage wedge:

$$\frac{1}{2}(4.6)(43560)(21) = \text{Volume in storage}$$

$$\begin{aligned} \text{Time} &= \frac{V}{\text{Rate}} = \frac{2103948}{134.3} = 15666 \text{ seconds} \\ &= 4.3 \text{ hrs, say } \underline{4 \text{ hours}} \end{aligned}$$

to draw down to 519.4'

Note: The normal flow of 120 cfs in the Musconetcong River causes a normal 4-foot stage through the stoplogs. This is not adequate for dam repair.

APPENDIX 5
REFERENCES

GRUENDYKE MILL DAM

APPENDIX 5
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GRUENDYKE MILL DAM

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